

SOME POINTS IN REGARD TO EMPYEMATA.

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SOME POINTS IN REGARD TO EMPYEMATA.

GENTLEMEN,—I thought that to-day we would consider some points about empyemata. First, as to the causes of empyemata. An organism is the ultimate cause, and probably the most common organism in these cases is the pneumococcus. It is, however, necessary to diagnose the empyema before the special organism at work can be determined; and, therefore, I think a bacteriological classification of empyemata is not the best for clinical purposes. I think you will find it useful to divide the causes of empyemata into two main groups, namely:—

- (1) The *common*,
- (2) The *possible*, causes.

The *common* causes are not many. First and foremost, we have pneumococcal affections of the lung—lobar *pneumonia* and *bronchopneumonia*. Secondly, and rather less commonly, we have *phthisis*. Thirdly, especially in children, we have empyemata which develop with no apparent cause, unless it be *neglect* and dirtiness. Such empyemata are sometimes called primary, but it is not at all unlikely that there has been some unrecognised bronchopneumonia in many of these cases, whilst in others the micro-organism may have found ingress from spots or impetigo on the skin. These are all the common causes.

There are many ways in which you can divide up the *possible* causes, but certainly we put under the first heading *secondary to trouble in the lung*. Amongst these causes we have to repeat lobar-pneumonia, bronchopneumonia and phthisis, and to add such conditions as bronchiectasis, or conditions in which there is gangrene of the lung or septic bronchopneumonia, or growth in the lung, or obstructed bronchus, from any cause, with putrefaction of the secretion which accumulates behind the obstruction.

We will take another heading. An empyema

may be *secondary to some sepsis, near to, but outside, the pleura*, as, for example, to sub-diaphragmatic abscess from any cause, such as a leaking gastric ulcer or growth. An empyema might in a similar way be secondary to an appendicular abscess, or to pyosalpinx, or to perinephric abscess; it might be secondary to pus in connection with the vertebræ or spinal caries; it might be secondary to a suppurating focus in the mediastinum, due to some such cause as an ulcerating epithelioma of the œsophagus; it might be secondary to an abscess in connection with a rib, tuberculous or otherwise.

In addition to being secondary to actual collections of pus near the pleural cavity, an empyema may result from a *metastatic condition in which infective material may be conveyed to the pleura from a distance through the blood-stream*, as in cases of osteomyelitis, or uterine sepsis after labour, or a simple effusion may become septic by infection with organisms absorbed from a boil, a whitlow, from pyorrhœa alveolaris, or from any other focus in some part away from the lung altogether.

There is another group of cases in which people who are ill with something entirely different may develop an empyema. For instance, a patient suffering from Bright's disease, or other *constitutional disorder*, may spontaneously develop an empyema, without there being any obvious source for the pleural infection.

When you have a case of empyema, always try to make up your mind what the cause is in that case. As evidence of the importance of not being content with merely diagnosing empyema, without also satisfying yourself as to the cause of it, I want to read you notes of a case that is now in Clinical. A woman, æt. 45, had been taken ill fourteen days before admission, with vomiting and diarrhœa. Four days later there was acute pain in the right side of the chest, and she was seen by two careful doctors, who thought that the signs indicated an empyema. They needled the chest, and found clear fluid with flakes of lymph in it. Following the needling, and over the area where it had been done, there developed a reddened, raised patch, which looked as if an abscess were forming under the skin, and the patient, who did not seem to be doing well, was sent up to the hos-

pital. On admission there was a large tender fluctuating swelling behind, over the right side of the chest, reaching from the posterior axillary line to half an inch internal to the spine, and from the tenth rib to the angle of the scapula. Over that area there was a very impaired percussion note, with bronchial breathing. The cardiac impulse was half an inch outside the left nipple line. A needle was put in, pus was found; an anæsthetic was given, a rib resected, and the part having been drained, the patient was put back to bed. We had correctly diagnosed and treated an empyema; I am afraid we felt satisfied, without having decided why the empyema had come there. For the next week the temperature was perfectly normal, and there was no evidence that anything else was the matter with the patient. But on the ninth day there was a rigor, and the temperature went up, and a series of rigors, with high temperature, occurred on the five following days. The wound seemed to be draining perfectly well, and one thought of infective endocarditis or pyæmia. We could not find any cause for the rigors and the pyrexia. On the twelfth day after admission it was noticed by my clinical assistant, Mr. Davies, that the liver was one and a half inches lower than it had been. There were no signs of heart failure, so that the enlargement could not be due to passive engorgement. It looked as if the liver had been pushed down, and that there was pus underneath the diaphragm. Mr. R. P. Rowlands performed a second operation; he found the diaphragm pushed right up, so as almost to bulge into the opening made in draining the empyema. He incised the diaphragm, and found pus beneath it; on putting his fingers into the sub-diaphragmatic abscess cavity, he found these two renal calculi free in the pus. The case was primarily a calculus in the kidney which had caused this perinephric sub-diaphragmatic abscess which, in turn, had infected the pleura and brought on an empyema. It is noteworthy that there had been no definite symptoms of renal calculus in this case. It was found on careful subsequent inquiry that there had been an obscure attack of pain in the right side of the abdomen two years previously, without any urinary changes. There was no pus, nor any blood, in the urine when the patient was admitted for her

empyema. One point, therefore, which you can learn from this case is that renal calculus may exist, and cause even a suppurative lesion, with practically no symptoms at all; but the main point that I wish you to remember is that the fact of there being an empyema does not finish your diagnosis; you must form your opinion as to the cause of the empyema before being satisfied.

I have an autopsy abstract of another case which illustrates that same point. The patient was a man, æt. 42, who, three weeks before admission, had a slight attack of pain which was referred to his right iliac fossa. He did not get well, being troubled with pain in the right side of the chest. He became dyspnoëic, and had all the signs of a right-sided pleuritic effusion. He was tapped, and fifteen ounces of blood-stained serous fluid were drawn off a week before he died. His pain in the right side of the abdomen was thought to have been a referred one, from the inflamed pleura, though appendicitis was discussed. He got worse, and was explored again, but no pus was found. The case was diagnosed as one of very acute pleurisy, the acuteness accounting for the blood-stained effusion. He died, and at the autopsy we found that this man had had an appendicitis. The appendix was only slightly inflamed. Behind the ascending colon there was a kind of narrow rivulet of dirty lymph, and this rivulet opened into a sort of superficial lake of pus over the surface of the liver. There was no hole in the diaphragm, but above the diaphragm there were a good many ounces of clear serous effusion which compressed the lower lobe of the lung on the left side, and an older adhesion which shut the pleural cavity into two, and thus prevented a great collection of pus above the septum from getting down on to the diaphragm. In the same pleural cavity we had both a serous effusion and an empyema, separated from one another by inflammatory adhesions, but both due to infection of the pleura by pus below the diaphragm. Therefore, again I say, if you have a case of empyema, try to make up your mind what the cause of that empyema is.

You will remember that it is extremely rare for an infected pleura to give rise to peritonitis, whereas it is not at all uncommon for an infected peritoneum to give rise to pleurisy and empyema. It seems that

this depends upon the fact that the lymphatic stream through the pores of the diaphragm is entirely from below upwards, and not from above downwards.

The next series of points that I want to touch upon are the physical signs that may arise from empyemata. These may be put into two main groups, namely:—

(1) Those *when the pus is in its usual position, namely, at the base of the lung.*

(2) Those *when the pus is in some abnormal position, not at the base of the lung.*

Remember that pulmonary physical signs depend entirely upon the physical condition of the lung. In the case of empyemata, the physical signs which you find are not due to the presence of pus, but to the fact that the pus expels the air from the surface parts of the lung.

The three main groups of *ordinary* physical signs that you get from empyemata differ according as there is (1) a small quantity of pus; (2) a medium quantity of pus; or (3) a great deal of pus. The physical signs when there is a great deal of pus in the usual position in a pleural cavity are easy to understand. The lung becomes completely airless from compression, so that there will be many negative signs; the affected side of the chest will not move properly with respiration; there will be no tactile vocal fremitus, no resonance, no entry, and therefore no vesicular murmur, no bronchial breathing, no rhonchi, no râles, no voice sounds; there will be two very important positive signs, namely—the intercostal spaces will be filled up, and the cardiac impulse will be displaced away from the affected lung.

When there is a good deal of pus, but not enough to express all the air from the upper part of the lung, we shall have similar physical signs, less in degree, but in addition we shall have skodaic resonance over the upper lobe, and, close to the upper border of the pus, here (shown on blackboard) we shall have compression of the alveoli, but not of the bronchial tubes, and may, therefore, expect a narrow strip of bronchial breathing with bronchophony, pectoriloquy, and very little ægophony.

It is in cases where, though the pus is at the base of the lung, its amount is *small*, that the chief difficulty as regards the interpretation of the physical

signs arises. This is particularly so in children, because in children, I do not know why it is—the pus usually forms into a thin layer upon the surface of the lung, and, therefore, causes very little compression of the lung and the chest wall is so soft that an empyema can bulge the chest wall out as easily as it can push the lung in. The result is that there may be no compression even of the alveoli, and, therefore, notwithstanding the presence of pus, the physical signs may be the same as those given by the healthy lung. I must repeat what I have said before—the *presence of pus does not* by itself give rise to typical physical signs; if there are abnormal physical signs in these cases, it is because the physical condition of the lung is altered by compression by the pus. *If the pus does not compress air out of the lung*, there will be the usual resonance and the usual vesicular murmur. If the pus is in sufficient quantity to express the air from the alveoli, without compressing the bronchial tubes there will be physical signs exactly like those of confluent bronchopneumonia. At the affected base there will be somewhat impaired resonance, and on auscultation bronchial breathing will be heard, with bronchophony, pectoriloquy, and probably crackling râles. The pus will be insufficient to cause those two important positive physical signs of empyema, viz., displacement of the heart, and filling up of the intercostal spaces. Such cases are termed, sometimes, *latent* empyemata.

I have notes of a case of latent empyema at the base of the lung, which gave rise to the above physical signs. The patient was a child, æt. 7 months, who was suffering from dyspnœa, drowsiness, and loss of appetite. The child had well-marked rickets, pulse 164, temperature 103, respirations 50. The two sides of the chest were symmetrical, and resonant everywhere except over the right lower lobe, where it was impaired but not *dull*. Beware of calling notes dull; most notes described as dull are notes of impaired resonance. When you have any resonance left, there must be some air in the lung. Over the area of impaired resonance there were bronchial breathing, fine râles and pectoriloquy, Over the rest of the lung there was puerile breathing without any râles at all. The dyspnœa became so great in that case, and the signs in the lung

were so few, that tracheotomy was done, in the belief that there was diphtheritic obstruction to the larynx. This gave some relief, but the child died next day. From the right side of the chest four ounces of fluid pus were measured, in addition to some thick lymph; on the left side there were two ounces of pus and very thick lymph over the lung. The right lower lobe was compressed, with some bronchopneumonia, and the left side all over had patches of bronchopneumonia, none of which came to the surface. There you have a case in which pus was present in both sides of the chest, with bronchopneumonia, but the compression by the pus was so slight that there was not enough absence of air in the lung to give definite physical signs, and therefore a diagnosis of empyema was very difficult to make. Very often the only way in which you can diagnose a case of empyema in children is by exploring the chest with a hollow needle, and even then it is not always possible to discover the pus. It is important to try in every suspicious case, because the child is almost certain to die if the pus be not let out.

Is there any danger in needling the chest? "It hurts when the needle goes through the skin," is an objection to needling the chest, but by giving chloroform or ether you get over that. In most cases the patient is already so ill that the pain produced by the needle is but little felt. It is seldom that any anæsthetic, either local or general, is required. As to the production of a pneumothorax, it is very difficult to bring about that condition in a healthy man. If you tried to produce a pneumothorax in your next-door neighbour, you would have to take away a portion of the rib, and put your finger into the hole made, and between the two layers of pleura for nearly an inch all round the opening where the rib was taken away, before you could overcome the capillary cohesion of the two layers of pleura. It is not at all difficult to produce a pneumothorax in the chest if you have got the layers of pleura already separated, but if you have got the two layers well in contact, putting a needle through the pleura would not produce a pneumothorax.

So much for the physical signs when the empyema is at the base of the lung. Let us now con-

sider some anomalous cases, in which the pus is elsewhere than at the base, being shut off by adhesions, and prevented from reaching the lowest part of the pleural cavity. It is clear that such empyemata may be almost anywhere; but there are four main headings under which they may be grouped, namely:—

(1) When the pus is loculated between the diaphragm and the lower lobe.

(2) When the pus is loculated between the lobes.

(3) When the pus is held up by a septum so as to be apical, or nearly apical, in position.

(4) When the pus is anterior to the lung, compressing the lung backwards.

These illustrations upon the blackboard (drawn by lecturer) will show you what I mean. I can also illustrate some of these conditions by cases, and by specimens from our museum.

I have here the notes of the case of a man, æt. 28, who came in complaining of being generally ill, and having profuse and foul expectoration at intervals. He had been hale and hearty up to nine months before admission. He was taken suddenly ill, with acute pain in the right side of his chest, and conveyed to Bow Infirmary, where he was laid up for seven weeks. The diagnosis was quite obscure. He improved, but he did not recover properly, and was brought here. His breath became very offensive and he began to expectorate foul matter in large quantities. During the nine months of his illness he lost 3st. in weight. He had got practically no abnormal physical signs at all. The chest was barrel-shaped and symmetrical, and moved well on respiration, with vocal fremitus on both sides, and fair vesicular murmur without râles. There was a case, then, of a man who had got something wrong with his chest, and who was bringing up a large quantity of foul sputum, and who was apparently suffering from some such affection as bronchiectasis, or a hidden empyema, or a sub-diaphragmatic abscess, or gangrene of the lung. There no physical signs to assist the diagnosis; gangrene of the lung was excluded by the absence of elastic fibres from the sputum. The temperature came down gradually, and a diagnosis of hidden empyema which had ruptured through the lung was made. A empyema may be hidden in two places. Supposing that you have the diaphragm

adherent to the edges of the lower lobe of the lung, so that anything between the diaphragm and the pleura could not go forwards or backwards, it would then have to enlarge upwards, and there would be a collection of pus between the diaphragm and lung, giving rise to a supra-diaphragmatic abscess. There might be no abnormal physical signs at all. Then again, an empyema may be hidden between the two lobes of the lung; pus may collect there and compress a certain amount of the lung all round, but if it does not render the lung airless at the surface, there will be no abnormal physical signs. This man had got an empyema between the lobes which had ruptured into the lung, and given rise to the foulness of the sputum which he brought up.

I have here a specimen illustrating such a condition as that. There (shown by lecturer) is the empyema, and they have had to cut the lung in all directions to expose the inter-lobar septum and show where the empyema is. There have been three cases in the hospital during the last two years, with the physical signs exactly the same as in the case of that man.

This (other) specimen shows you a complete septum separating the pleural cavity into two entire halves, an upper and a lower pleural cavity, with pus in the one above, and none in the one below.

I will read you notes of an actual case of this. The patient was a boy, *æt.* 4, who had measles nine months before admission, and bronchitis ever since having that disease. Eventually his face began to swell, he brought up blood-stained sputum, was feverish, and lost appetite. On admission the pulse was 120, the temperature 99.2, respiration 60. The patient's face was swollen, he had marked cyanosis of the lips, and pains over the intercostal spaces. The left lung was dull from the apex to the base, with bronchial breathing, crackling râles, bronchophony, and pectoriloquy all over. The right upper and middle lobes were resonant, the right lower lobe was dull, with bronchial breathing and crackling râles all over it. The liver could be felt as low as the umbilicus. Both sides of the chest were explored in three places, but no pus was found. The child died the same night. An old pleurisy was found, and this formed a septum shutting off the lower part of the left pleural cavity from the upper,

which contained five ounces of pus. The right and left lower lobes were without any empyema at all, but were almost airless from confluent bronchopneumonia. Here, then, was an example of apical empyema, and it was a remarkably difficult condition to diagnose, but it is one that occurs from time to time. The mere fact of not finding pus with a needle is no proof that pus is not present.

I have got all kinds of specimens here to show you. Here is a lung, and you can see the upper and lower lobes, the posterior and anterior surfaces, and a septum between the two. Here we have a large cavity with a pyogenic membrane lining it in the *front* part of the lung. In this specimen the empyema is not behind, but in front, shut off by a vertical septum. What would be the physical signs in this case? As I have already said, physical signs are not due to pus being present, but to the pus making the lung contain no air. In this patient there was enough pus in the front of the chest to compress the lower lobe backwards, and make it as airless as if the pus had been behind compressing the lower lobe forwards and upwards. These diagrams (drawn on blackboard) will show you what I mean. The physical signs with pus here (shown) would be identical with the physical signs with pus there (shown). Therefore, if we percussed that patient, there would be complete dulness behind, just as much as if the pus were behind instead of in front. In that case there would be diagnosed quite certainly pus at the base, and a needle would be put in and no pus found. Why not? Because the needle would have to pass through skin, and muscles, and between the ribs, the parietal and visceral pleura, and then these two inches or more of compressed lower lobe (indicated on blackboard) before the needle entered the abscess cavity. You can miss the pus unless you put your needle in far enough—a very important thing to remember. It is remarkably difficult to discover pus with a needle in many cases. If you keep in mind the pictures of empyemata I have drawn for you, you will no longer be surprised at this, I think. Again, you will sometimes put a needle into the same hole, draw off clear fluid one time, and pus another time, within a few minutes of one another. The explanation is that there are loculi, and there has been a little difference in the direction in which the needle

has been pointed in the two explorations; a serous loculus was first tapped, whilst the second time the end of the needle had entered a purulent loculus. Then again, if you have only a little pus in the chest you may go right through the pus, and unless you preserve a vacuum in the barrel of your syringe whilst you are drawing your needle out, you will get no pus. I have seen pus missed also by going in slowly. You require to put your needle in with a jerk. If you put your needle slowly into a pleural cavity, you may simply cause the pleura to bulge forward in front of the needle as a sort of cap to it, without its actually entering the empyema cavity at all.

There is one last point, and it is a thing to beware of. In dressing an empyema, do not let the drainage tube slip inside the pleural cavity. That may happen. I know a patient whose empyema did not seem to be healing up properly, and a second operation was done, and this time the tube which had been used at the first operation was removed from the pleural cavity.

I do not profess to have dealt in any way completely with the question of empyemata. The treatment is, of course, to let the pus out as soon as it is diagnosed. Diagnosis is the main thing. If you learn nothing else from our talk to-day, I would ask you to carry away in your mind at least two lasting impressions. The first is, that in addition to diagnosing empyema it is essential to try and make up your mind as to its cause. The second is that, whilst many cases have the most typical physical signs, there are very good reasons why, in other cases, the physical signs may not be at all those which you might at first think are essential to empyema.

